SQA Past paper questions

2023 – Paper 1 – Question 8

A function, f, is defined on $\mathbb{R}$, the set of real numbers, by $f(x) = x^3 + 3x^2 - 9x + 5$.

Find the coordinates of the stationary points of f and determine their nature. 6

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2019 – Paper 1 – Question 1

Find the x-coordinates of the stationary points on the curve with equation $y = \frac{1}{2}x^4 - 2x^3 + 6$. 4

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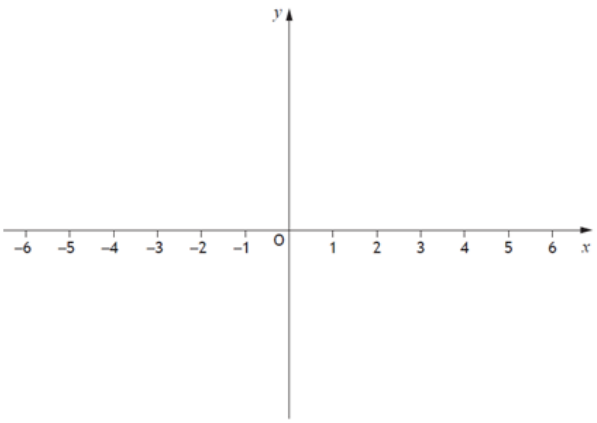
2018 – Paper 1 – Question 15

A cubic function, f, is defined on the set of real numbers.

- $(x+4)$ is a factor of $f(x)$
- $x = 2$ is a repeated root of $f(x)$
- $f'(-2) = 0$
- $f'(x) > 0$ where the graph with equation $y = f(x)$ crosses the y-axis

Sketch a possible graph of $y = f(x)$ on the diagram in your answer booklet. 4



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2016 – Paper 1 – Question 9

(a) Find the x-coordinates of the stationary points on the graph with equation $y = f(x)$, where $f(x) = x^3 + 3x^2 - 24x$. 4

(b) Hence determine the range of values of x for which the function f is strictly increasing. 2

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2014 – Paper 1 – Question 21

A curve has equation $y = 3x^2 - x^3$.

(a) Find the coordinates of the stationary points on this curve and determine their nature. 6

(b) State the coordinates of the points where the curve meets the coordinate axes and sketch the curve. 2

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2013 – Paper 2 – Question 3

(a) Given that $(x - 1)$ is a factor of $x^3 + 3x^2 + x - 5$, factorise this cubic fully. 4

(b) Show that the curve with equation

$$y = x^4 + 4x^3 + 2x^2 - 20x + 3$$

has only one stationary point.

Find the x-coordinate and determine the nature of this point. 5

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2011 – Paper 1 – Question 22

A function f is defined on the set of real numbers by $f(x) = (x - 2)(x^2 + 1)$.

Find the coordinates of the stationary points on the curve with equation $y = f(x)$ and determine their nature. 8

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2009 – Paper 2 – Question 1

Find the coordinates of the turning points of the curve with equation $y = x^3 - 3x^2 - 9x + 12$ and determine their nature. 8

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2008 – Paper 1 – Question 21

A function f is defined on the set of real numbers by $f(x) = x^3 - 3x + 2$.

(a) Find the coordinates of the stationary points on the curve $y = f(x)$ and determine their nature. 6

(b) (i) Show that $(x - 1)$ is a factor of $x^3 - 3x + 2$.

(ii) Hence or otherwise factorise $x^3 - 3x + 2$ fully. 5

(c) State the coordinates of the points where the curve with equation $y = f(x)$ meets both the axes and hence sketch the curve. 4

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2007 – Paper 1 – Question 9

A function f is defined by the formula $f(x) = 3x - x^3$.

(a) Find the exact values where the graph of $y = f(x)$ meets the x- and y-axes. 2

(b) Find the coordinates of the stationary points of the function and determine their nature. 7

(c) Sketch the graph of $y = f(x)$. 1

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Specimen 1 – Paper 1 – Question 22

(a) Find the stationary points on the curve with equation $y = x^3 - 9x^2 + 24x - 20$ and justify their nature. 7

(b) (i) Show that $(x - 2)^2(x - 5) = x^3 - 9x^2 + 24x - 20$.

(ii) Hence sketch the graph of $y = x^3 - 9x^2 + 24x - 20$. 4

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